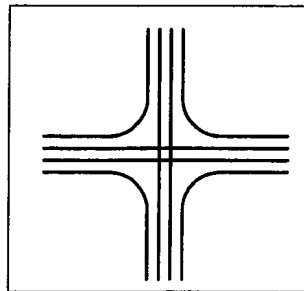


According to this method, a fibre tow (5) is placed (4) on carrier material (3) and held there in position by stitches (needle (1) and thread (2)). Between every stitch the carrier can be moved along axes x and y, by precise control means. Therefore, placement of carbon fibre tow precisely in all directions on the carrier is possible.

It is therefore possible to place the fiber tows on the carrier in the following form:



According to this drawing, a preform is formed by four fiber tows at all points. At the intersections, two fiber tows from in each direction cross over, producing a node with four fiber tows, the same number of tows as are present

elsewhere in the preform.

Accordingly, a known process has been used to make the preform recited in the present claims, "having at least one intersection or node point, and having a substantially constant material thickness and substantially constant fiber volume content at the at least one intersection or node point and adjoining portions of the preform."

Withdrawal of this rejection is requested.

Claims 24, 26 through 31, 38, and 40 through 45 have been rejected under 35 USC 103(a) over Deckers et al in view of Kam et al and PCT '932, optionally further taken with either one of Kawasaki et al or Blad et al, and optionally further in view of Schmeal et al or Darrieux.

Deckers et al does not relate to self-supporting grids, but rather discloses a method for producing fiber reinforced structures in which fiber elements are used to reinforce a composite shell where the fibers can be arranged on the shell in the form of a grid. As noted in the Abstract, the Deckers et al invention is directed to placement of discrete, elongated fiber elements in mutually superimposed relationship to define reinforcement or stiffening members for the interiors or exteriors of composite shells and the consolidation of the fibers to form a cured composite structure.

The reinforcement of Deckers et al cannot be handled by itself if there are not greater thicknesses in the intersection point than in the adjoining regions. While there is some possibility of arranging the fibers end-to-end instead of overlapping, the fiber strand must be cut for this purpose and as a result, there is inherently a gap in the intersection point. Even if this were not present, a corresponding grid would not be usable by itself since the fiber tows in the

intersection points have no cohesion.

Thus, Deckers et al does not disclose or suggest making a fiber composite component in the form of a grid usable by itself, and it is not disclosed or suggested to use tailored fiber placement technology.

Similarly, the Kam et al reference relates to a method for producing a fiber reinforced shell. The inside of this shell is lined with the grid structure, and according to column 2, lines 64 et seq, any suitable combination of high strength reinforcing fiber and organic polymeric binder can be employed to obtain a stiffening member. The preferred composite material is a graphite-epoxy composite formed from chopped graphite fibers impregnated with epoxy resin, as disclosed at column 3, lines 7 through 10. Clearly, there is no disclosure or suggestion of utilizing a grid formed by fiber placement technology and Kam et al does not disclose or suggest that the reinforcing structure itself may be used as a grid.

PCT '932 discloses the tailored fiber placement method for forming a grid, and discloses using the system to reduce "aerial density" of composite fibers being laid by the machine. However, as in the case of Deckers et al and Kam et al, this reference discloses making a reinforcing structure applied to one surface of an object, and the process as disclosed is generally utilized in the aviation and aerospace technology industries.

Thus, the combination of Deckers et al, Kam et al and PCT '932 suggests, at most, utilizing tailored fiber placement technology to form a reinforcement for an object, but not a grid to be utilized alone, such as in a high temperature furnace.

The Kawasaki et al reference has been discussed in detail

in previous responses, and discloses a fiber grid reinforcement of a flat shape with first and second directions perpendicular to each other. First fiber bundles extend along the first direction and second fiber bundles extend along the second direction, with the second fiber bundles intersecting perpendicularly the first fiber bundles. In accordance with the abstract and the specification at column 3, lines 19 et seq, each of the second fiber bundles includes a greater number of fibers than each of the first fiber bundles, such that the fiber grid reinforcement has a greater flexibility in the first direction than in the second direction. This leads one to the conclusion that the quantity of fibers in the intersection points is greater than other points, and as disclosed at column 3, lines 25 et seq, the bulge at the intersection should be compacted to the same thickness as the other sections of the fiber grid. Considerable pressure has to be expended to achieve a cross section of equal thickness, thus risking breaking of the fibers.

Similarly, the Blad et al reference contains no suggestion to make a grid based upon a preform which is made according to fiber placement technology. Instead, Blad et al discloses a reinforcement structure with a first layer of resin and a second layer of filled resin continuous with the first layer, which for example, is applied to a pipe. There is no suggestion of a grid corresponding to the teaching of the present invention.

Schmeal et al and Darrieux have been cited to show the desirability of utilizing mechanical means to secure and retain fibers during a placement operation.

However, the references cited, taken individually or in combination, do not disclose or suggest the desirability of utilizing tailored fiber placement technology to form an

unsupported preform with nodes of the same material thickness and fiber volume as the remainder of the preform, and impregnating such a preform with a monomer or polymer, and curing the impregnated preform in a mold. The cited references teach reinforcements rather than self-supporting preforms, and do not disclose utilizing tailored fiber placement to obtain the nodes of constant thickness and volume.

Withdrawal of this rejection is accordingly requested.

Claims 25, 32, 34 through 37 and 46 have been rejected under 35 USC 103(a) over the above combination of references, taken further with Booth.

Booth discloses a grids made of carbon strands in which the node points have a greater density and thickness than the adjoining regions. Thus, Booth does not cure the defects of the above-cited references, and withdrawal of this rejection is requested.

Claim 33 has been rejected under 35 USC 103(a) over the above combination of references, taken together with Shoesmith et al '627 or Shoesmith et al '306. *As noted in the previous response, Claim 33 was canceled in the amendment filed on July 14, 2004.*

Claims 40 through 42 have been rejected under 35 USC 103(a) over the above combination of references, taken further with Handermann or Kent et al.

The Handermann reference discloses production of prepregs using reinforcing fibers without any reference to making grids with at least one intersection or node point having a substantially constant material thickness and substantially constant fiber volume. There is no disclosure or suggestion of producing a grid which is usable by itself.

The Kent et al reference discloses the manufacture of

fiber reinforced laminates, and also does not disclose a grid as presently claimed.

Withdrawal of this rejection is requested.

In view of the foregoing amendments and remarks, Applicants submit that the present application is now in condition for allowance. An early allowance of the application with amended claims is earnestly solicited.

Respectfully submitted,



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